Evaluation of multiparametric MRI (mpMRI) at 3T in Prostate Cancer in a private outpatient setting

M. Pixberg, J. Ghafur, D. Hercher, J. Müller-Hübenthal

Dr. med. Jonas Müller-Hübenthal
Facharzt für Diagnostische Radiologie
Facharzt für Nuklearmedizin
PRAXIS im KÖLN TRIANGLE

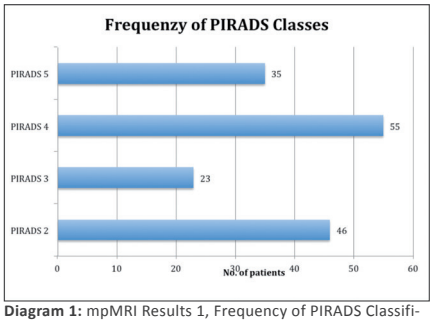


Diagram 1: mpMRI Results 1, Frequency of PIRADS Classification (N=159)

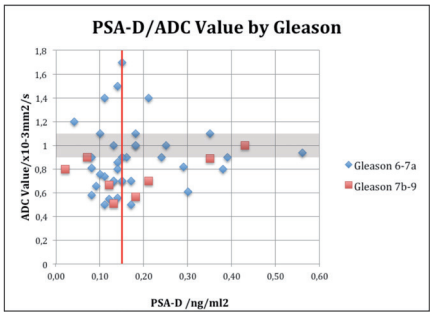


Diagram 2: PSA Density and ADC Value by Gleason

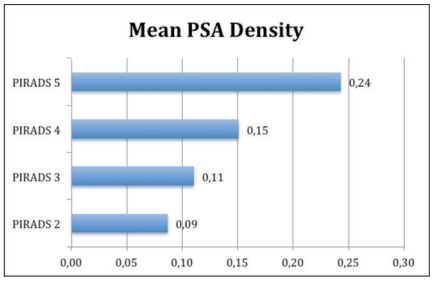


Diagram 3: mpMRI Results 2, Classification and PSA Density n=93

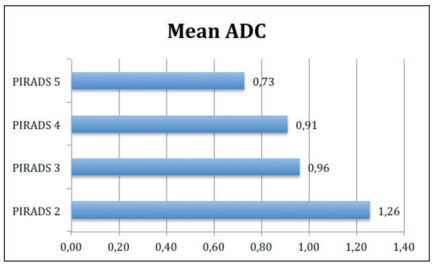
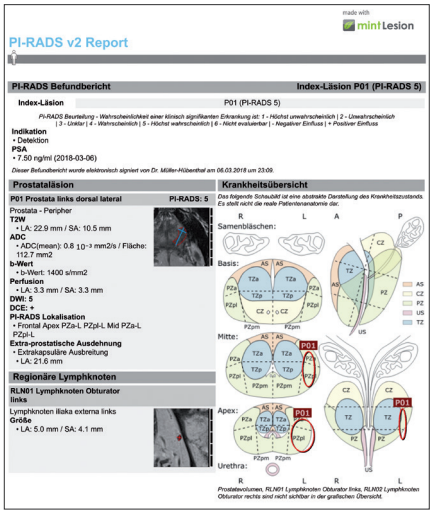


Diagram 4: mpMRI Results 3, Classification and Mean ADC Value n=95



Case 1: 62j m, PIRADS 5, Gleason 9, MINT report

Aim

Assess the performance of mpMRI @ 3T according to PI-RADS 2.0 scoring system for detection of significant prostate carcinoma (sPCA).

Demonstrate an association between PSA density, ADC Value and Gleason Score.

Materials & Methods

Between 1/2017 and 6/2018, 165 men underwent mpMRI examinations of the prostate. Age ranged from 42 to 88 years, median 68 years. Specifications of PI-RADS 2.0 were applied to a Skyra XQ pTx 64 ch (Siemens, Erlangen, Germany). DWI was calibrated with phantom scans, divergences were less than 3%. Mean ADC <0.9x10-³mm/s² was considered suspicious, mean ADC >1.1 normal. DCE was used on all examinations. Standardized reports were generated using a commercially available software tool (Mint lesion®, Mint Medical, Dossenheim, Germany).

PSA Density was calculated by division of PSA serum level prior to the MRI Scan by segmented volumetry of the prostate. PSAD>1.5 ng/ml/ml was considered abnormal. sPCA were defined as Gleason>=7b. Ultrasound transrectal fusion-guided biopsy was conducted with an integrated dedicated system (UroNav®, Philips Healthcare) on 24 men, 10 were operated and 27 underwent cognitive fusion biopsy (**diagram 5**).

In our outpatient setting follow-up information was obtained from 78 of 165 Patients (47%). Follow-up was initially obtained with a personal visit and on the basis of a questionnaire completed by referring doctors. Missing information was collected by individual telephone contact with referring doctors and patients. Response was limited with
reference to the new EU GDPR.

Results

Diagram 1 shows the distribution of index lesions in PIRADS assessment categories. No examination was classified PIRADS 1.

Diagram 2 demonstrates that all sPCA have a significant diffusion restriction, but may have a normal PSAD.

As expected PSAD and Gleason score increase and mean ADC decreases with high PIRADS categories (**diagram 3, 4 and 7**).

All sPCA had a significant diffusion restriction (ADCmean<1 x 10-3mm/s², **diagram 8**).

US fusion transrectal biopsy was implemented for small (5-10mm), anterior and apical lesions and still produced plausible results. Small low ADC and/or DCE+ subregions could be directly targeted.

Conclusions

As proof of concept, mpMRI of the prostate following PIRADS 2.0 standard can be implemted in a private outpatient setting.

PSAD >1.0 ng/ml/ml seems to be a sensitive and >1.5 a specific marker for high PIRADS categories and may help identify low / intermediate risk PCA.

All sPCA had a significant diffusion restriction – DWI being the central stratification tool in mpMRI of the prostate. Intermediate and normal ADC do not exclude low risk PCA.

US guided fusion biopsy is suitable for smaller lesions in difficult locations. However, no further obvious benefit over cognitive fusion biopsy could be demonstrated.

More consistent follow-up information using quantitative imaging platforms like MINT lesion® would be necessary to evaluate the negative predictive value of classification PIRADS 1 and 2 mpMRI of the prostate and the performance of active surveillance.

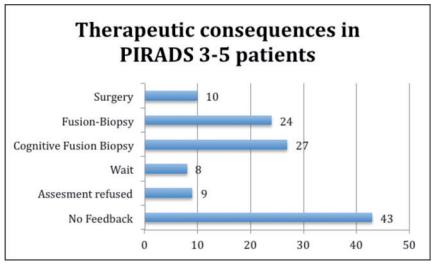


Diagram 5: therapeutic consequences from mpMRI of the prostate in PIRADS 3-5, n=121

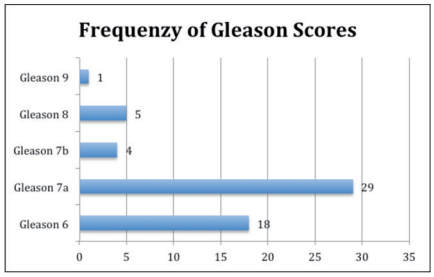


Diagram 6: Gleason Score / number of patients (N=57)

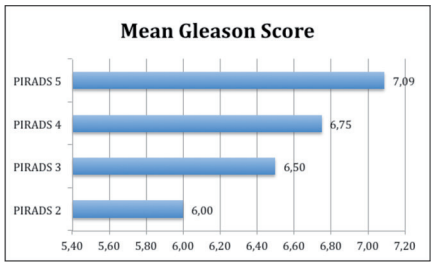


Diagram 7: PIRADS score and Mean Gleason Score (N=57)

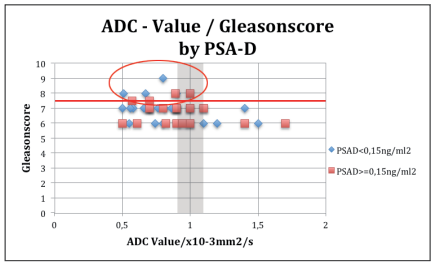
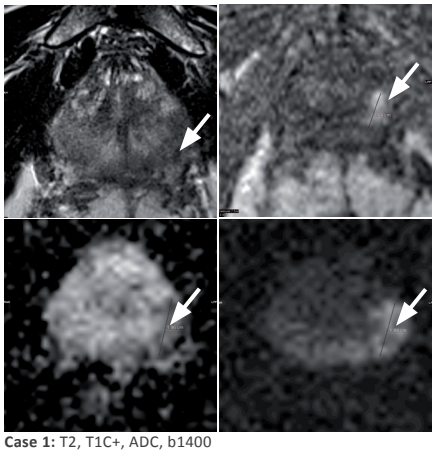
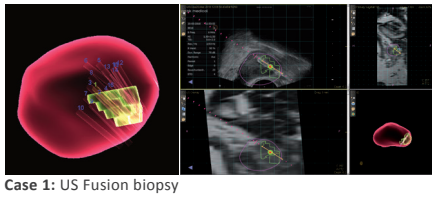


Diagram 8: Gleason Score / ADC Value (N=48)



Case 1: T2, T1C+, ADC, b1400



Case 1: US Fusion biopsy